

Geosyntec consultants

BMP Site Ranking Methodology:

Statistical consideration of permit limits, natural background levels, number of samples, and exceedance frequency

Robert Pitt, Ph.D., P.E., BCEE, D. WRE, University of Alabama
 Brandon Steets, P.E. & Rita Kampalath, Ph.D., Geosyntec Consultants

9TH ANNUAL CONFERENCE
 SEPTEMBER 9-11, 2013
 SQUAW VALLEY
 LAKE TAHOE, CALIFORNIA

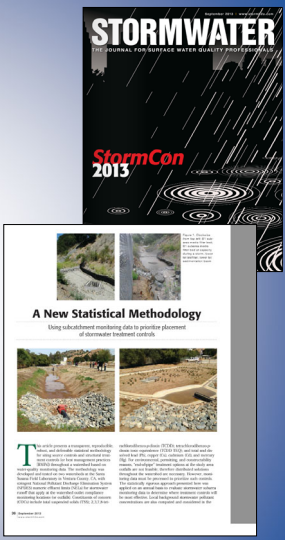
TAKING STORMWATER QUALITY MANAGEMENT TO NEW HEIGHTS

1

Geosyntec consultants

Outline

1. Site Introduction & Regulatory Context
2. BMP Site Ranking Methodology
3. Conclusions



9th Annual Conference – September 9-11, 2013 – Lake Tahoe, CA

2

Geosyntec consultants

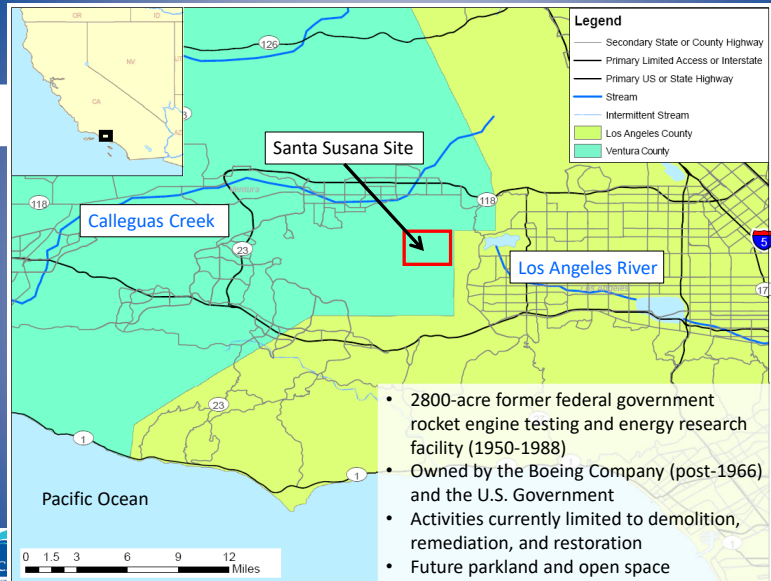
1. Site Introduction & Regulatory Context



CASQA

9th Annual Conference – September 9-11, 2013 – Lake Tahoe, CA

3



Legend

- Secondary State or County Highway
- Primary Limited Access or Interstate
- Primary US or State Highway
- Stream
- Intermittent Stream
- Los Angeles County
- Ventura County

- 2800-acre former federal government rocket engine testing and energy research facility (1950-1988)
- Owned by the Boeing Company (post-1966) and the U.S. Government
- Activities currently limited to demolition, remediation, and restoration
- Future parkland and open space

0 1.5 3 6 9 12 Miles

4

Geosyntec
consultants

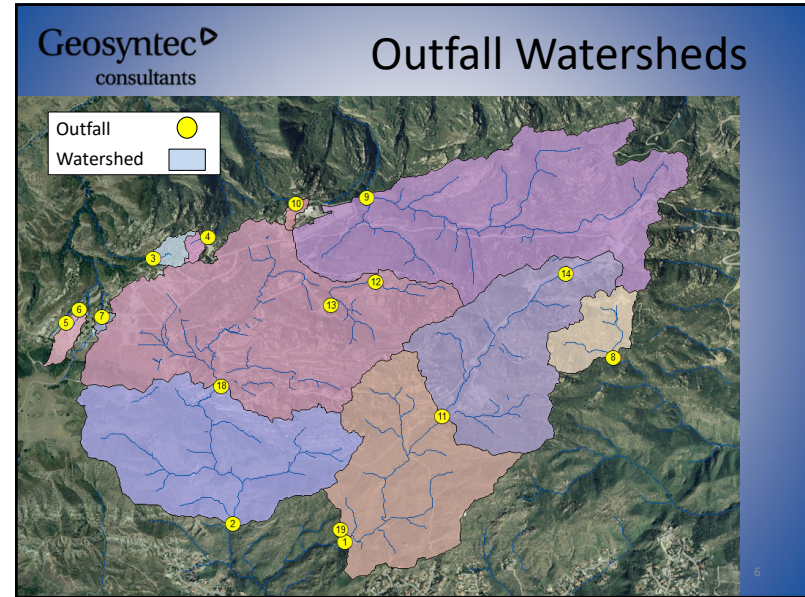
Regulation of SSS Stormwater

- Stormwater discharges are regulated by the Los Angeles RWQCB through an individual NPDES permit
- Permit includes Numeric Effluent Limits (NELs) for a wide range of constituents including:
 - Dioxins (TCDD TEQ): 2.8×10^{-8} µg/L
 - Total Lead: 5.2 µg/L
 - Total Copper: 14 µg/L

Geosyntec
consultants

9th Annual Conference – September 9-11, 2013 – Lake Tahoe, CA

5



6

Geosyntec
consultants

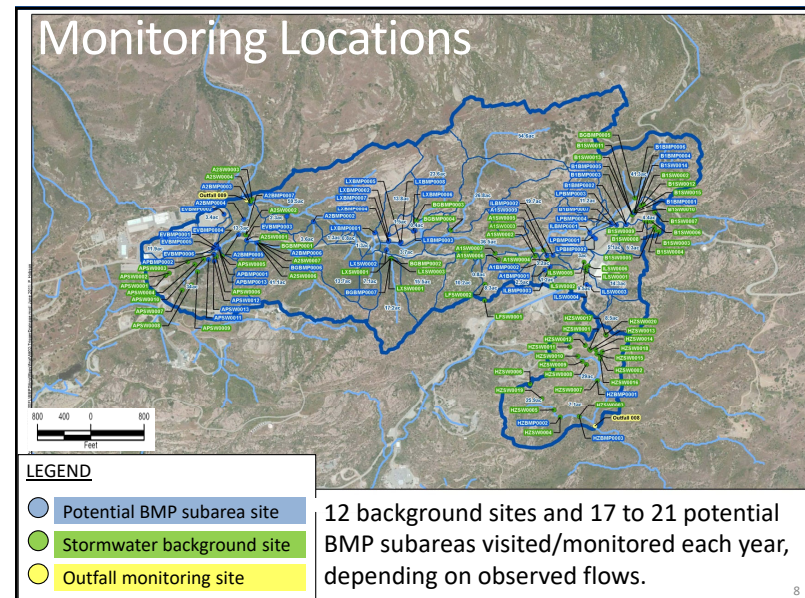
Expert Panel

Members:

- Dr. Bob Gearheart, Humboldt State University
- Jonathan Jones, Wright Water Engineers
- Dr. Michael Josselyn, WRA Consultants
- Dr. Robert Pitt, University of Alabama
- Dr. Michael Stenstrom, University California, Los Angeles

Scope:
To oversee stormwater planning and design work, and provide input on monitoring, source removal activities, and various NPDES permit issues

7



8

Geosyntec[®]
consultants

Public Involvement Process

- Boeing and Panel are committed to public involvement and transparency through regular meetings and tours
- Panel has been open to direct communication, thus building confidence and trust



CASQA

9th Annual Conference – September 9-11, 2013 – Lake Tahoe, CA

9

9

Geosyntec[®]
consultants

Previous CASQA Talks

- Media Performance Testing – CASQA 2009
- New BMP Designs – CASQA 2011
- Subarea monitoring and BMP siting prioritization methodology – CASQA 2012

CASQA

9th Annual Conference – September 9-11, 2013 – Lake Tahoe, CA

10

10

Geosyntec[®]
consultants

2. BMP Site Ranking Methodology



CASQA

9th Annual Conference – September 9-11, 2013 – Lake Tahoe, CA

11

Geosyntec[®]
consultants

Overview

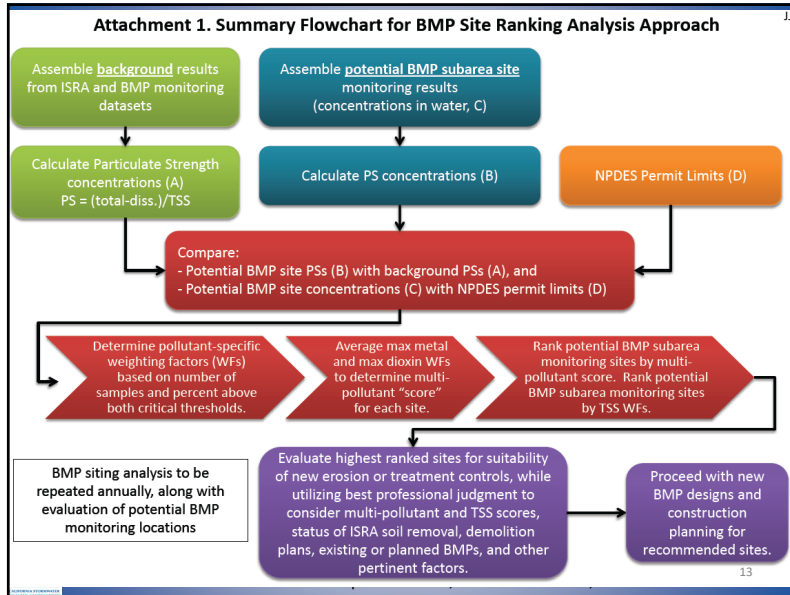
- Innovative, statistically rigorous approach
- Rank potential BMP subarea monitoring sites based on comparisons of:
 - Stormwater subarea concentrations with NPDES permit limits
 - Stormwater subarea particulate strengths with stormwater background particulate strengths
- Monitoring locations were scored based on number and percent of samples above NPDES permit limits and/or background
- Locations then ranked based on scores, and top locations identified
- Best professional judgment for BMP recommendations
- Process to be repeated annually through 2014

CASQA

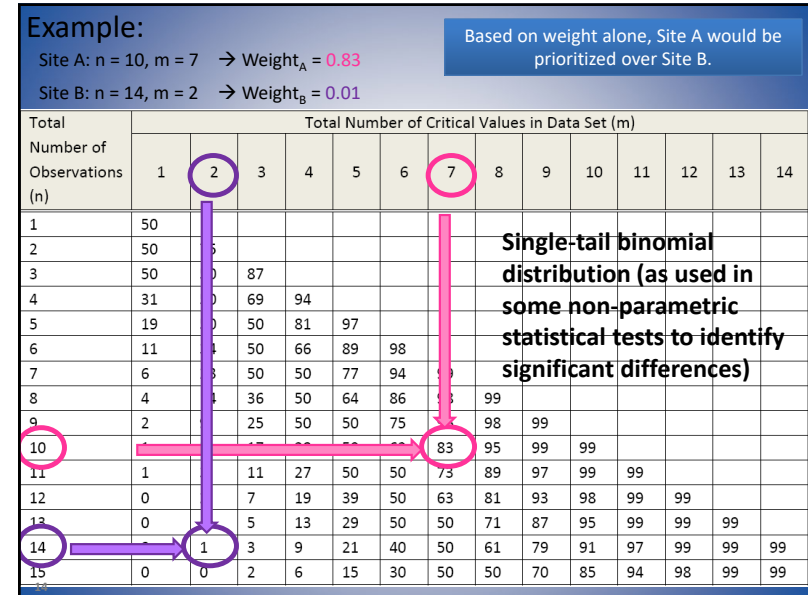
9th Annual Conference – September 9-11, 2013 – Lake Tahoe, CA

12

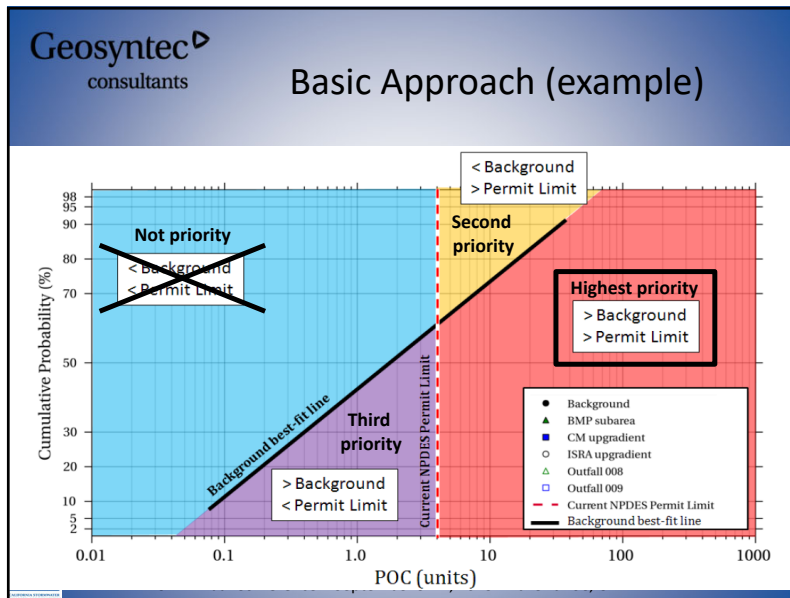
12



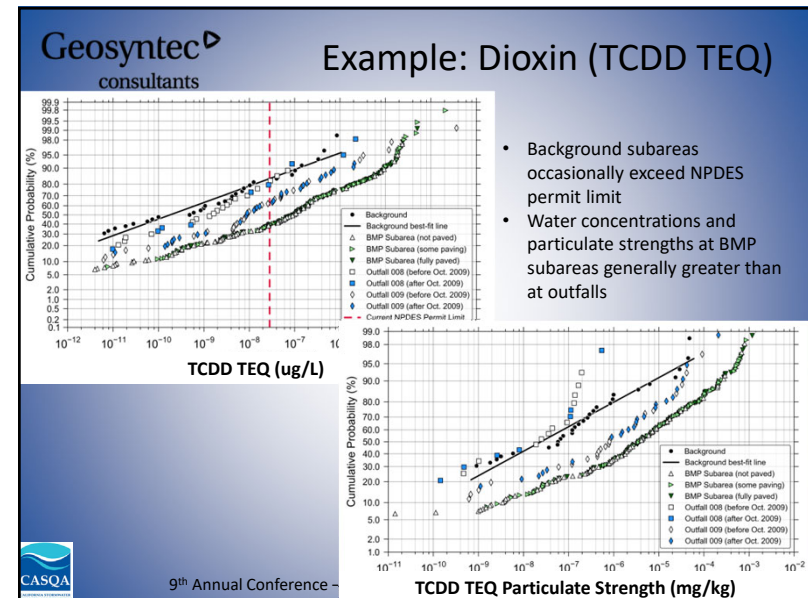
13



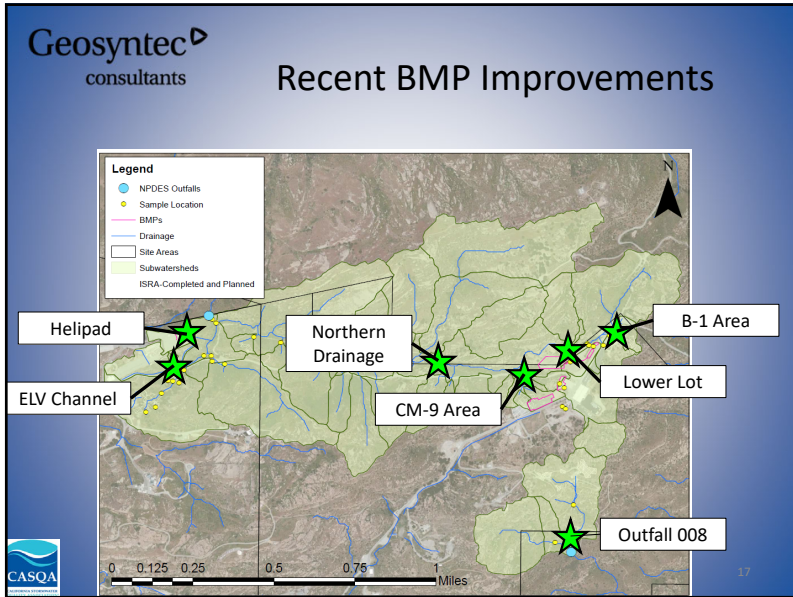
14



15



16



17

2012/2013 Ranking Results

Rank	Potential BMP Subarea (Co-locations)	Description	BMP Status	Approximate Upgradient Drainage Area (ac)	Multi-Constituent Score	Rank from Maximum Metal Weighting	Rank from Maximum Dioxin Weighting	Total Number of Events Sampled
1	ILBMP0002 ^a	Road runoff to CM-9	Addressed by current BMP; influent site	2.5	0.95	1 ^e	6	9
2	EVBMPO003 (A2S1W0001) ^f	CM-1 upstream west	Addressed by current BMP; influent site	11.8	0.94	3 ^e	1	17
3	EVBMPO001-A ^b	ELV culvert inlet (helipad road and ELV ditch, composite)	Will be addressed by BMP; discontinued	2.5	0.67	17.5	7	5
4	EVBMPO002 ^b	Helipad (pre-sandbag berms)	Addressed by current BMP	4.1	0.66	15.5	10	10
5.5	EVBMPO005 ^b	2012/13 ELV drainage ditch (pre-ELV-1C ISRA)	Will be addressed by BMP	11	0.63	21	9	2
5.5	A1S1W0009-A	CM-9 downstream-underdrain outlet (post-A1LF asphalt removal, pre-filter fabric over weir boards)	BMP site has since been improved (old site)	16.4	0.63	4	21	1
7	EVBMPO004 ^b	2012/13 Lower Helipad Road	Will be addressed by BMP	1.8	0.62	2	31.5	3
8	APBMP0001 ^b	Asphle culvert inlet/road runoff	NA	34	0.60	5	21	2
9	ILBMP0001 ^b	Lower lot 24" stormdrain outlet	Addressed by current BMP and planned building demolition	23	0.57	23	8	16
10	B1BMP0004 (B1S1W0015, B1BMP0004-5)	B-1 media filter north	Addressed by current BMP; influent site	3.7	0.53	29	2	6
14.5	LPBMP0001-A	Lower lot sheetflow (pre-gravel bag berms)	Addressed by current BMP; discontinued	5.1	0.50	37.5	3	6
14.5	B1S1W0002 ^a	Woolsey Canyon Road runoff	Addressed by current BMP; influent site; discontinued	1.3	0.50	10	21	2

18

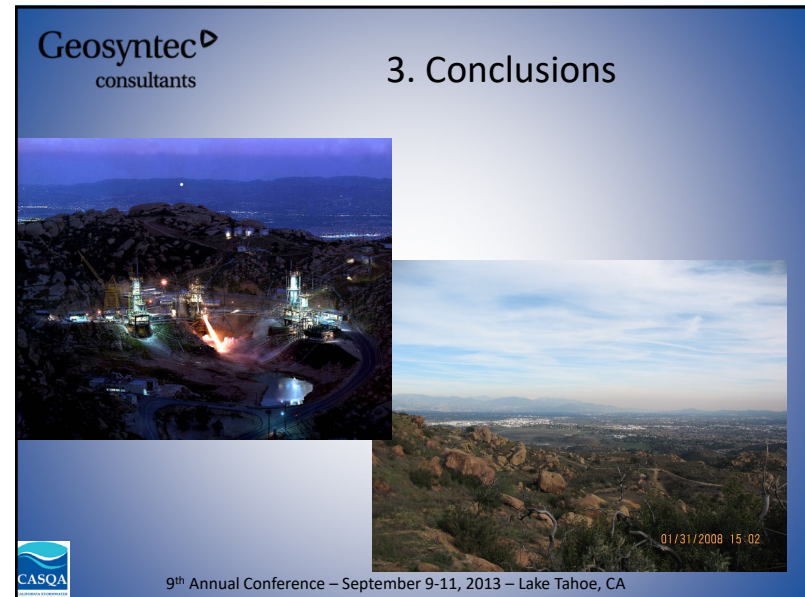
2012/2013 Ranking Results

Rank	Potential BMP Subarea (Co-locations)	Description	BMP Status	Approximate Upgradient Drainage Area (ac)	Multi-Constituent Score	Rank from Maximum Metal Weighting	Rank from Maximum Dioxin Weighting	Total Number of Events Sampled
14.5	B1BMP0001 (B1S1W0010)	B-1 media filter inlet (post-media filter installation)	BMP site has since been improved (old site); influent site; discontinued	4.5	0.50	10	21	3
14.5	LXBMP0006	LOX east, runoff along dirt road	ISRA planned	0.43	0.50	10	21	1
14.5	LPBMP0002	Lower parking lot influent to cistern	Addressed by current BMP; influent site	4.2	0.50	10	21	0
14.5	EVBMPO006 ^b	2012/13 Area II Road near ELV ditch	Will be addressed by BMP	11	0.50	10	21	1
14.5	B1S1W0014-A (B1BMP0006)	B-1 media filter effluent (pre-media filter reconstruction)	BMP has since been improved (old site); discontinued	4.7	0.50	10	21	7
14.5	LPBMP0001	Lower lot sheetflow (pre-gravel bag berms)	BMP site has since been improved (old site); discontinued	5.1	0.50	10	21	2

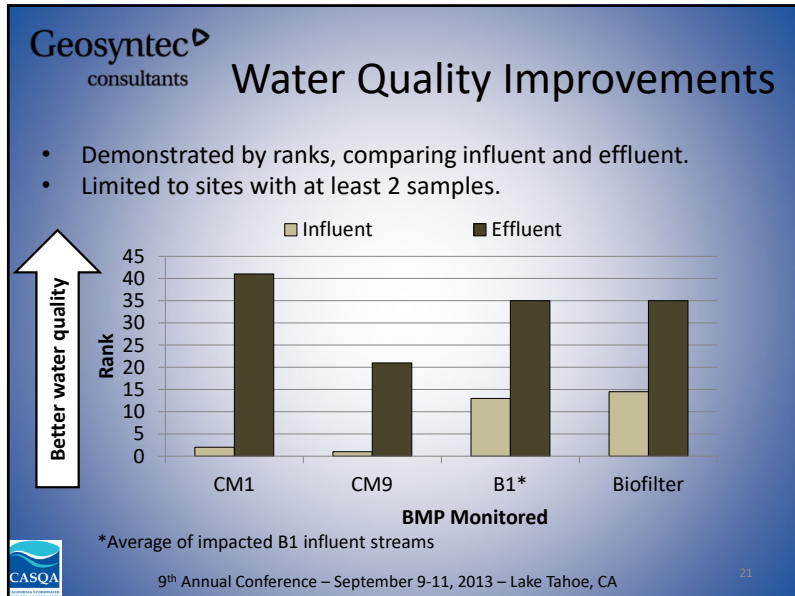
Notes

- Potential BMP subareas sorted by multi-constituent score, computed as described in Section 5.
- (^f) These potential BMP subarea monitoring locations are upstream of existing stormwater quality treatment controls.
- (^g) These potential BMP subarea monitoring locations have new planned (i.e., designed and ready for construction) stormwater quality treatment controls.
- (^h) 2,3,7,8-TCDD detected in the 2012/13 water year in these subareas.
- The rounding of weights may account for similar weights being ranked differently.
- Approximate drainage areas based on the cumulative drainage area of the SWMM catchment in which the monitoring location is located (Geosyntec, 2011). At locations where the monitoring point is upstream of the catchment outlet a "C" sign is used.
- Bolded** locations indicate that both the NPDES permit limit and 95th percentile background particulate strength threshold were exceeded for any one POC.
- Gray text indicates historic subarea monitoring sites that are discontinued.
- All sites ranked in the top 15 of the multi-constituent table are located in Outfall 009.

19



20



21

- ### Geosyntec consultants Benefits & Advantages
- **Precedent** – methodology has been presented to RWQCB staff and accepted for use in BMP planning
 - **Proven** – methodology has been tested and shown to result in effective site prioritization and demonstrable water quality improvement
 - **Defensible** – methodology is based on sound statistical principles
 - **Flexible** – methodology can accommodate wide range in number of samples, sites, and pollutants
 - **Robust** – BMP recommendations generally don't change when a few sample results are removed here and there
 - **Accounts for background** – prioritization results consider when observed water quality is due to background sources
 - **Inexpensive** – statistical analysis is cheaper than watershed modeling (i.e., model development, testing, calibration, scenario simulation, etc.)
 - Methodology can also be used in combination with modeling as 2nd line of evidence for BMP siting
- CASQA 9th Annual Conference – September 9-11, 2013 – Lake Tahoe, CA 22

22

- ### Geosyntec consultants Potential Use & Applicability
- For sites or watersheds with multiple monitoring locations and a regulatory driver for prioritizing BMP placement (such as NELs, numeric effluent limits, or NALs, numeric action levels!), for instance:
 - Large Industrial General Permit sites (e.g., landfills, field labs, federal facilities)
 - MS4 outfalls in a watershed under a TMDL
 - Agricultural watersheds
 - Wherever watershed-wide BMP planning is needed and limited resources require spatial prioritization
 - Limitations:
 - Significant data needs (number of locations) – although it's possible to mitigate for this (e.g., by using modeling or land use-based data)
 - Requires regulators to be understanding of an iterative process...
- CASQA 9th Annual Conference – September 9-11, 2013 – Lake Tahoe, CA 23


23

- ### Geosyntec consultants Acknowledgements
- Other Panel members
 - The Boeing Company
 - Paul Costa & Debbie Taege
 - NASA
 - Pete Zorba
- CASQA 9th Annual Conference – September 9-11, 2013 – Lake Tahoe, CA 24

24

Geosyntec
consultants

Q&A



SSFL Surface Water Expert Panel work products can be found at:
http://www.boeing.com/aboutus/environment/santa_susana/water_quality.html